Technical Memorandum for the WIS 23 Fond du Lac to Plymouth Corridor Study Traffic Forecasts

December 15, 2015

WISCONSIN DEPARTMENT OF TRANSPORTATION

Executive Summary

Overview

The proposed WIS 23 improvement project will convert the existing 19-mile two-lane roadway between the cities of Fond du Lac and Plymouth to a four-lane, median divided expressway with interchanges, at-grade intersections and intersection improvements. Expressway improvements typically provide for new lanes alongside the existing roadway while flattening hills and curves and replacing old pavement.

The preferred alternative for WIS 23 followed years of in-depth analysis, public input and completion of a Limited Scope Supplemental Final Environmental Impact Statement and Record of Decision (LS SFEIS/ROD)[1] that was officially reviewed and approved by the Federal Highway Administration (FHWA) in March 2014. Construction on the WIS 23 project was scheduled to begin in March of 2015.

Construction was suspended following a May 22, 2015 court ruling that vacated the March 2014 Record of Decision (ROD)[2]. In part, the court ruling questioned how the Wisconsin Department of Transportation (WisDOT) explained its methodologies and conclusions related to traffic forecasts, and asked WisDOT to clarify whether updated population data would significantly change the traffic forecasts included in the environmental document. This Technical Memorandum responds to the Court's requests and provides additional information on WisDOT's forecasting methodology.

WisDOT's Forecasting Methods

Each year, WisDOT completes hundreds of roadway traffic forecasts for corridor plans and projects. WisDOT uses several standard techniques and tools to help understand how vehicle traffic could be expected to utilize roadways. The Court asked for further explanation regarding two of these tools: the Northeast Region Travel Demand Model (TDM) and the Traffic Analysis Forecasting Information System (TAFIS).

Travel demand models are sophisticated tools used to forecast future travel patterns. The TDM typically considers data including: trip generation (the number of vehicular trips to be made); trip distribution (where those trips go); mode choice (how the trips will be divided among the available modes of travel); and trip assignment (forecasting the route trips will take). The TDM is essentially a representation of the supply and demand for travel in a particular area.

TAFIS is an automated procedure and computer program that operates on the principle of creating roadway traffic forecasts using a statistical regression. WisDOT will, as necessary, estimate TAFIS when the TAFIS computer program cannot use historic traffic count information or current count information. "Estimated TAFIS" is also known as a manual regression.

WisDOT's traffic forecasting models and procedures are accepted within the transportation planning and engineering professions, and WisDOT's methods are consistent with those used in many other

[1] Administrative Record (AR) 21309 to AR 22262.
[2] Docket No. 61, Case No. 11-CV-545 (E.D. Wis.).

states. For the WIS 23 study, WisDOT used the TDM results for the July 2012 final traffic forecasts[3] that appear in the LS SFEIS/ROD. TAFIS and estimated TAFIS forecasts helped WisDOT determine that the TDM was producing reasonable results. The TDM also allowed comparison between various build alternatives, so for these reasons, WisDOT's final traffic forecast in the LS SFEIS/ROD relied on the July 2012 TDM results.

Department of Administration (DOA) Population Projections

The January 2014 DOA population projections would not significantly change the traffic forecasts or impact the alternative analysis found in the LS SFEIS/ROD[4]. The Northeast TDM does not use population projections directly to produce traffic forecasts. Instead, the TDM uses the type and location of certain developments, such as households, employment, and other traffic generators, to forecast future traffic volumes. WisDOT reviewed DOA's 2014 population projections as part of the Indirect and Cumulative Effects (ICE) analysis in the LS SFEIS/ROD[5].

The 2014 DOA population projections and WisDOT's ICE analysis did not indicate any changes to the anticipated locations and types of development. As such, WisDOT concluded that the new population projections would not affect the study's traffic forecasts and that no further evaluation was necessary.

Verification Analysis Completed in September 2015

While the 2014 DOA population projections do not affect this study's traffic forecasts, the Northeast TDM has been updated several times since the July 2012 forecasts were produced to include other types of data from DOA and other sources. Given the increased focus on the traffic forecasts for this study and to verify the July 2012 forecast results, WisDOT completed a TDM analysis for WIS 23 in September, 2015 as part of preparing this Technical Memorandum. The September 2015 TDM analysis continues to support the selection of the 4-Lane Build On-Alignment Alternative.

There have also been other updated environmental considerations relevant to this study. These include a newly recognized endangered species (northern long-eared bat), as well as State statutory changes to bicycle and pedestrian accommodations and community sensitive design provisions.

Upon reinstatement of the ROD, WisDOT and FHWA intend to further document its findings regarding the September 2015 TDM analysis and these additional environmental considerations under 23 CFR s. 771.129(c).

Conclusion

Traffic forecasting is a dynamic process that considers numerous factors including traffic count and socio-economic data along with other societal trends. WisDOT utilized widely-accepted methods and technical expertise to determine forecasted traffic volumes that reasonably represent how WIS 23 can

[3] AR 21971 AR 21414, and AR 21943. Throughout this Technical Memorandum "final traffic forecasts" refer to the WIS 23 final traffic forecasts for all the alternatives for the year 2035, July 2012 TDM results.
[4] AR 21411 and AR 21947.
[5] AR 21479 and AR 22001.

be expected to be used in the future. The July 2012 traffic forecasts were appropriately prepared and analyzed for the LS SFEIS/ROD and support the selection of the 4-Lane Build On-Alignment alternative.

In conclusion, WisDOT and FHWA are requesting that the ROD be reinstated for the WIS 23 study project. Upon reinstatement of the ROD, WisDOT and FHWA intend to further document its findings regarding the September 2015 TDM analysis and additional environmental considerations under 23 CFR s. 771.129(c).

Table of Contents

Introduction

The proposed WIS 23 improvement project will convert the existing 19-mile two-lane roadway between the cities of Fond du Lac and Plymouth to a four-lane, median divided expressway with interchanges, at-grade intersections and intersection improvements. Expressway improvements typically provide for new lanes alongside the existing roadway while flattening hills and curves and replacing old pavement.

The Environmental Document[6] for the WIS 23 corridor study has been challenged in court by 1000 Friends of Wisconsin. On May 22, 2015, the Court vacated the Record of Decision for this study and, on remand to the Federal Highway Administration (FHWA) and the Wisconsin Department of Transportation (WisDOT), the Court requested additional information related to the study's traffic forecasts. The Court asked for further explanation regarding (Request 1) how different traffic forecasting methods were applied to produce the Study's final traffic forecasts and (Request 2) whether population forecasts from the Wisconsin Department of Administration (DOA) released in January 2014 would significantly change the study's traffic forecasts and alternatives analysis. This Technical Memorandum responds to the Court's requests and provides information on WisDOT's forecasting methodology.

Request 1: Travel Demand Model and Traffic Forecasting Information System Methods

As part of the remand, the Court has asked for a response regarding the following information,

> *"On remand, the agencies must prepare a document that explains exactly how they arrived at the projections of future traffic volumes that appear in the impact statement by identifying the separate results of the TAFIS projection and the TDM projection, identifying how those results were altered or adjusted, and explaining how any compromise between the results of the two projections was reached."*[7]

The court also requests WisDOT to outline forecasting tool growth rates and to describe if the growth rates are within WisDOT policy guidelines.

Request 2: Wisconsin Department of Administration Population Projections

The Court has also asked for the following,

> *"Also on remand, the agencies must consider whether the updated Department of Administration population data will significantly change the traffic projections that appear in the impact statement and, if so, whether that affects the agencies' consideration of reasonable alternatives. If they consider these questions and conclude that the updated population data does not significantly change the traffic projections or affect the consideration of reasonable alternatives, then they must explain in writing why not, at which point the plaintiff may challenge this decision and I will review it. If they consider these questions and conclude that the updated*

[6] AR 21309. Throughout this Technical Memorandum, "Environmental Document" refers to this Study's March 17, 2014 *Limited Scope Supplemental Final Environmental Impact Statement and Record of Decision*, beginning at Administrative Record ("AR") 21309.

[7] *1000 Friends of Wis., Inc. v. USDOT*, Case No. 11-C-545, slip op. at 23-24 (E.D. Wis. May 22, 2015) (ECF No. 61).

population data is significant, then the agencies must prepare an appropriate NEPA document addressing the new information."[8]

Verification Analysis

To further validate the preferred alternative selection, a verification TDM analysis was performed and is explained in a separate section following the responses to the Court's remand requests.

This Technical Memorandum will address each request, and discuss additional analysis that was developed during the preparation of this Technical Memorandum.

[8] *1000 Friends*, slip op. at 24 (ECF No. 61).

Request 1: Travel Demand Model and Traffic Forecasting Information System Methods

On remand, the Court has requested that WisDOT explain how it arrived at the final traffic forecasts that appear in the LS SFEIS/ROD[9] by identifying the separate results of the Traffic Analysis Forecasting Information System (TAFIS) forecast and the travel demand model (TDM) forecast. WisDOT should explain altered or adjusted results and the methods to reach any compromises between results.

This section explains how WisDOT arrived at the final traffic forecasts using information from the TDM, TAFIS and "estimated TAFIS" methods. For the WIS 23 study, WisDOT compared the forecast tools and their results, but ultimately did not combine the TDM, TAFIS, and the estimated TAFIS outputs. TAFIS results were used only to help WisDOT determine that the TDM results were reasonable. Ultimately, the forecast results showed modest growth through the design year (2035), consistent with anticipated land use patterns and development along the corridor.

TDM, TAFIS and Estimated TAFIS Forecast Tools

WIS 23 traffic forecast process primarily involved two tools, the Northeast Region TDM and the TAFIS. Other methods to forecast traffic include manual regressions (for the purposes of this report, called "estimated TAFIS"), spreadsheet tools and other ways of analyzing or combining data, depending on the data that is available when a forecast is produced.

The Northeast TDM geographically covers northeast Wisconsin. It can be used for specific projects like the WIS 23 study. TDMs, in general, are sophisticated tools used to forecast future travel patterns. The Northeast TDM considers

- Trip generation (the number of vehicular trips to be made);
- Trip distribution (where those trips go);
- Mode choice (how the trips will be divided among the available modes of travel); and
- Trip assignment ("assigning" the route trips will take).

The TDM also accounts for roadway characteristics, including whether a certain highway has two lanes or four lanes (as described in the TDM Alternative Analysis and Geometric Attributes section below). Due to this feature, the TDM is especially useful in the NEPA context, because the TDM allows WisDOT to compare various build alternatives. WisDOT relied on the TDM results for the final traffic forecasts of the different alternatives in the LS SFEIS/ROD. The final traffic forecast results are identified in Appendix B as Table 1.

TAFIS is an automated procedure and computer program that operates on the principle of creating roadway traffic forecasts using a statistical regression[10]. WisDOT will estimate TAFIS in situations when the TAFIS computer program cannot use historic traffic count information correctly due to traffic count

[9] AR 21971 AR 21414, and AR 21943. Throughout this Technical Memorandum "final traffic forecasts" refer to the WIS 23 final traffic forecasts for all the alternatives for the year 2035, July 2012 TDM results.
[10] Regression refers to a measure of the relation between the mean value of one variable and corresponding values of other variables

updates. "Estimated TAFIS" is also known as a manual regression because it creates traffic forecasts that are increasing, but at a decreasing rate over time, similar to TAFIS. For more information, see the section called Estimated TAFIS Forecasts. For the mathematical formula of the Box-Cox transformation used to determine TAFIS and estimated TAFIS, see AR 17713.

Traffic Counts

There are many inputs that are important for traffic forecasting, but the most current representative traffic counts are among the most crucial. Traffic counts represent the total number of vehicles using a particular part of the roadway over a specific period of time. Traffic counts are measured in "average annual daily traffic" or AADT.

For this study, counts were gathered at seven locations along WIS 23. These locations are identified by their "TRADAS ID" number. The locations are shown in Appendix C, Exhibit 1.

Traffic counts are important because they provide the starting point for traffic forecasts. WisDOT collected additional traffic counts during the course of this study to better understand how current traffic changes may be impacting forecasts. The traffic counts for the LS SFEIS/ROD are further explained in the (September 2012 WIS 23 Traffic Count and Forecast History Memo AR 21931-21944).

TDM Forecast Methods and Results

To develop the TDM forecasts, WisDOT used standard TDM adjustment methods that follow nationally accepted best practices (For more information on applications of TDM adjustments see National Cooperative Highway Research Program (NCHRP) Report #765 Analytical Travel Forecasting Approached for Project-level Planning and Design, which is an update to NCHRP Report #255, Highway Traffic Data...Planning and Design, mentioned in AR 21969 and 21926)[11]. Additional information on how the TDM was developed is available in the Administrative Record 14170. WisDOT's confidence in the TDM was supported by TDM statistics described more thoroughly in AR 14267 and AR 21931. Further, the TDM in 2012 had been used since 2010, thus providing further assurances that the TDM was functioning well. Per the Court's request, this section provides a high-level explanation of the specific adjustments related to the TDM outputs used for the WIS 23 LS SFEIS/ROD.

TDM Mathematical Adjustments

WisDOT made two main adjustments to the initial TDM results that are reflected in the July 2012 traffic forecast for the WIS 23 study:

[11] AR 21969, 21926, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_765.pdf, and http://teachamerica.com/tih/PDF/nchrp255.pdf

- WisDOT adjusted the TDM's "raw assignments"--that is, the direct output for this corridor--to reflect the 2012 traffic counts
- WisDOT made a corresponding adjustment to the TDM's raw assignments for the future year (For the purpose of the LS SFEIS/ROD year 2035 was used)

These adjustments are described in more detail below, and laid out in Appendix B, Table 2.

TDM adjustments are necessary to accurately describe the traffic in the base and future years. The TDM base year for the WIS 23 forecasts was 2005. The base year was developed from the 2000 U.S. Census data, and then modified to reflect the most current long-range plan base year for the surrounding metropolitan planning organizations (MPOs) per standard practice. Base year traffic counts or *assignments* do not necessarily reflect actual traffic counts from 2005. As a starting point in developing the TDM forecast, WisDOT recorded the TDM's 2005 base year assignment at all of the count locations along the corridor on a spreadsheet. To reflect the 2012 traffic counts, WisDOT then adjusted the base year (2005) assignments to the count year (2012). This reflected the use of 2012 traffic counts in the forecast process. This adjustment across the corridor followed standard protocols. (See Appendix A: Calculations for more information).

The TDM's 2035 future year traffic output was adjusted to account for traffic assignment related variances. The following adjustment methods are nationally accepted best practices, as outlined in NCHRP reports[12]; the *difference adjustment*, the *ratio adjustment* and a combination of the two called *the average of the difference and ratio adjustment*. The *difference adjustment* method, adjusted the future year assignment based on the absolute difference between the count and the base year assignment. The *ratio adjustment* method, adjusted the future year traffic assignment based on the ratio of the traffic count and base year traffic assignment. The average of the difference and ratio adjustment was a simple average of the two [Forecast = (difference + ratio)/2].

For the results of the adjustments to the July 2012 TDM No-Build Alternative, see Appendix B: Table 2. This table contains the adjustments for the No-Build alternative as an example.

The TDM adjustments reflect standard model adjustment procedures. Without the adjustments, variances in traffic assignments would not approximate actual count information. For more information see AR 17672.

TDM Growth Rates

WisDOT calculated average annual growth rates as part of traffic forecast production. The average annual growth rate measures average traffic change on a roadway over time. Two different growth rates were associated with the TDM analysis.

[12] National Cooperative Highway Research Program (NCHRP) Report #765 Analytical Travel Forecasting Approached for Project-level Planning and Design, which is an update to NCHRP Report #255, Highway Traffic Data...Planning and Design, mentioned in AR 21969 and 21926)

The first growth rate described the raw data, straight from the TDM, and compared base year (2005) to future year (2035) (Appendix B, Table 2, column F). The WIS 23 growth rates accurately captured corridor conditions in the base year and best captured localized conditions for each alternative under consideration in the future year, (including adjustments using the NCHRP[13] procedures). Appendix B, Table 2 shows the TDM growth rates for the No-Build alternative.

The second growth rate was the adjusted TDM data or average annual traffic change from the 2012 traffic count year to the 2035 forecast year. These are also noted in Appendix B, Table 3, column E. For comparison, Appendix B, Table 3 shows the minimum (0.5%) and maximum (5.0%) growth rates per WisDOT policy. For more information see AR 17672 and Appendix A: Calculations, for growth rates.

WisDOT has confidence in the growth rates because they are a result of a mathematical equation following WisDOT's procedures. WisDOT uses expertise to determine if the applied growth rate is appropriate, as a matter of policy.

TDM Alternatives Analysis and Geometric Attributes

The TDM accounted for roadway characteristics, including locations where WIS 23 had two lanes or four lanes, allowing WisDOT to compare alternatives as part of the July 2012 analysis. WisDOT relied on the TDM results for the final traffic forecasts of the different alternatives in the LS SFEIS/ROD. The final traffic forecast results are identified in Appendix B, Table 1. On the WIS 23 corridor, the alternative roadway configurations included:

- No-Build
- Passing Lane without Left-turn Lanes
- Passing Lane with Left-turn Lanes
- Hybrid 4-Lane to County G, Passing Lane County G–County P
- 4-Lane Build On-Alignment

After the No-Build alternative was forecast, the TDM was carefully modified to reflect the number of lanes and roadway lane configurations for each alternative.[14] The TDM was rerun with each alternative and the TDM raw assignments were adjusted as described above. Forecast volumes were recorded for each alternative. These can be found in Appendix B, Table 1.

TAFIS and Estimated TAFIS' Role in the WIS 23 Forecast

The TDM results, or the final traffic forecasts, were used for the LS SFEIS/ROD. TAFIS and estimated TAFIS were used as comparative tools. This comparison was generally indicated throughout the Administrative Record as a forecast produced "with TDM and TAFIS" to simplify the discussion of the

[13] National Cooperative Highway Research Program (NCHRP) Report #765 Analytical Travel Forecasting Approached for Project-level Planning and Design, which is an update to NCHRP Report #255, Highway Traffic Data...Planning and Design, mentioned in AR 21969 and 21926)

[14] The TDM cannot be configured to evaluate the impacts of turning lanes and median refuges, and therefore cannot distinguish between the two Passing Lane alternatives. For the Passing Lane alternatives, passing lanes were added to the TDM throughout the corridor in location where passing lanes could be reasonably located.

different results. The comparisons using this data are indicated in Appendix B, Table 4. The final traffic forecast used for the LS SFEIS/ROD relied on these comparisons.

Tables in AR 23455 and AR 22477[15] demonstrate specific examples in the Administrative Record where this comparison occurred. The January 2012 forecast analysis[16] shows that TAFIS was compared to the January TDM. In February, the estimated TAFIS forecast was compared to the TDM forecast (as evident in AR 14752 and AR 22477).

Estimated TAFIS was again compared with the TDM in March 2012 (amid increased discussion about forecast differences of the build alternatives). This is evident in AR 14870 and is shown in Appendix B, Table 4. In July 2012, TAFIS and estimated TAFIS were not run or produced as part of the forecasting process. This is because build alternatives were being considered. The March estimated TAFIS forecasts were compared to the July 2012 TDM to consider the alternatives. This comparison is shown in Appendix B, Table 4. As part of forecast policy, the decision was made to ensure that forecasted volumes in the TDM and TAFIS were to be within 10% of each other (AR 21940). The March estimated TAFIS and July TDM results together are within 10% of each other or within 10% of the average[17]. Forecast comparisons provided confidence that the TDM was performing well and was calibrated, even though the TDM had modest growth rates. The TDM forecasts for the No-Build alternative were near the WisDOT policy minimum of 0.5% traffic growth.

Further, the TDM provided the ability to compare alternatives, and WisDOT determined the TDM forecasts were appropriate to use as the final July 2012 forecasts. The July 2012 TDM results, based on June 2012 counts, led to the final traffic forecasts in the LS SFEIS/ROD. Ultimately, both the TAFIS and TDM approaches used reasonable assumptions to produce useful results, accepted academically and in practice.

In September 2012, a memorandum[18] was written describing the traffic count and forecast history. Comparisons between TDM, TAFIS, or estimated TAFIS were described in the traffic forecast administrative records (noted above). Any associated exceptions or notes to procedures are written in the Administrative Record for each traffic forecast completed.

TAFIS Adjustments to Variables

A few variables were adjusted related to TAFIS. The first was an adjustment to the variable that indicated (for traffic forecasting purposes) whether the traffic count location was in an urban or rural area. In generating the WIS 23 forecasts, the TAFIS program chose a variable that pertains to a rural location.

[15] For reference AR 23455 and AR 22477 are shown in Appendix D
[16] AR 23455
[17] See Appendix A: Calculations for example calculations of the 10% check.
[18] AR 21931

Other minor adjustments to variables were made. The residual adjustment to the variable accounted for the difference between the actual traffic count and the best fit regression[19] produced by TAFIS, based on historic traffic counts.

All TAFIS adjustments to variables followed standard procedures. The TAFIS residual and the relative adjustments to variables that are used, when specific methods are chosen are outlined in the Transportation Planning Manual, Chapter 9[20].

Estimated TAFIS Forecasts

Estimated TAFIS produced results for a statistically significant regression[21], when the TAFIS program could not produce a statistically significant regression or produce other results due to the program functions. *Estimated TAFIS* is also known as a *manual regression*. In February 2012, TAFIS was estimated using a base 2011 traffic count, as this was the most recent information and 2012 counts weren't yet in the TAFIS program. This procedure used the same statistical approach as TAFIS and involves similar adjustments (including location in urban and rural areas and the adjustment for the residual). After estimating TAFIS, WisDOT ensured reasonable forecasts, using analytical judgement. The estimated TAFIS Forecast growth rate calculation is noted in Appendix A, Calculations. The March 2012 estimated TAFIS forecast output is listed in Appendix B, Table 5.

Conclusion for Request 1: Travel Demand Model and Traffic Forecasting Information System Methods

WisDOT calculated TDM, TAFIS, and estimated TAFIS and compared results of the models to determine the final traffic forecasts. WisDOT relied on the TDM results for the final traffic forecasts that appear in the LS SFEIS/ROD. TAFIS and estimated TAFIS helped WisDOT determine whether the TDM results were reasonable. The TDM also allowed comparison between various build alternatives. For these reasons, WisDOT's final traffic forecast in the LS SFEIS/ROD relied on the TDM results.

[19] Regression refers to a measure of the relation between the mean value of one variable and corresponding values of other variables.
[20] AR 17713
[21] Regression refers to a measure of the relation between the mean value of one variable and corresponding values of other variables.

Request 2: Wisconsin Department of Administration Population Projections

On remand, the court has requested WisDOT explain whether the DOA population projections[22], released in January 2014, significantly change the final traffic forecasts that appear in the LS SFEIS/ROD, and if so, whether any significant changes to the final traffic forecast would impact the consideration of alternatives found in the LS SFEIS/ROD[23].

The January 2014 DOA population projections do not significantly change the final traffic forecasts or impact the alternative selected in the LS SFEIS/ROD[24], because the Northeast TDM does not use population projections as direct inputs to produce traffic forecasts. WisDOT reviewed DOA's 2014 population projections as part of the Indirect and Cumulative Effects (ICE) analysis in the LS SFEIS/ROD[25]. Because DOA's 2014 population projections did not indicate changes to the location and type of development, the projections would not affect the study's traffic forecasts so no further evaluation was necessary.

Population Projections and TDM Data

General population data, such as the 2014 DOA data, is not used directly in the TDM. Instead, the TDM uses the type and location of certain developments, such as households, employment, and other traffic generators, to forecast future traffic volumes. General population projections do not provide the necessary information to determine direct inputs like number, mode, origin and destination, and trip distribution for the model.

Socio-economic data is useful for forecasting traffic, and is used in the TDM. Generally speaking, useful TDM data includes households, retail and service employment, as well as other known traffic generators like schools and big-box retail locations.[26] For the Northeast TDM, some of this data, such as households, comes from DOA publications. Once WisDOT collects the necessary socio-economic data, WisDOT works with local government planning officials to coordinate with local planning efforts.

WisDOT reviewed whether the 2014 DOA data would impact the understanding of development patterns along the corridor. To do this, the 2014 DOA population projections were qualitatively reviewed in the LS SFEIS/ROD[27], Indirect and Cumulative Effects (ICE) section.[28] For example, if the general population in Fond du Lac County decreases, the number of people driving vehicles on WIS 23 may or may not decrease. This is because not everyone who lives in Fond du Lac County drives on WIS 23. In order to develop a reliable forecast, it is important to understand development patterns,

[22] AR 21129, AR 21127, AR 21448, AR 21485, and http://doa.wi.gov/divisions/intergovernmental-relations/demographic-services-center/projections
[23] AR 21411 and AR 21947
[24] AR 21420
[25] AR 21479 and AR 22001
[26] AR14170
[27] AR 21495 and AR 22019
[28] AR21475-21543 and AR21999-22154

including where people live and work. This is then translated to portray how people use specific roadways.

As part of the draft environmental document (the LS SDEIS[29]), WisDOT performed an in-depth ICE analysis with input from local governments and planning officials. After the 2014 DOA data was released and before the final LS SFEIS/ROD[30], WisDOT revisited the ICE analysis to determine the significance of the new population projections. In light of the new 2014 DOA data and input from the MPOs and WisDOT during cooperative planning efforts, WisDOT concluded that although development may be expected to slow somewhat, the anticipated locations and types of development remain unchanged.

The 2014 DOA population projections and WisDOT's ICE analysis did not indicate any changes to the anticipated locations and types of development. As such, WisDOT concluded that the new population projections would not affect the study's traffic forecasts, and therefore there was no reason to evaluate the new population projections in the context of traffic forecasts. Since the ICE analysis and traffic forecasts are not affected by this information, the consideration of reasonable alternatives is not affected.

Conclusion for Request 2: Wisconsin Department of Administration Population Projections

The 2014 DOA population projections and WisDOT's ICE analysis did not indicate any changes to the anticipated locations and types of development. As such, WisDOT concluded that the new population projections would not affect the study's traffic forecasts, and therefore there was no reason to reanalyze the alternatives.

[29] AR 17842 and AR 18665
[30] AR 21309 to AR 22262

Verification Analysis in September 2015

The response to Request 2 explains how the 2014 DOA population projections do not affect this study's traffic forecasts, and how this information is not included as a direct input into the TDM. However, the Northeast TDM has been updated several times since the July 2012 forecasts were produced to include other types of data from DOA and other sources. Given the increased focus on the traffic forecasts for this study and to verify the July 2012 forecast results, WisDOT completed a TDM analysis for WIS 23 in September, 2015 as part of preparing this Technical Memorandum. As discussed below, the September 2015 TDM analysis continues to support the selection of the 4-Lane Build On-Alignment Alternative; as such, no substantial changes to the findings of the March 2014 ROD are proposed.

The September 2015 TDM analysis was a preliminary forecast result, reflective of and using only the Northeast TDM. The TDM analysis used the most recent version of the Northeast TDM, as well as the most current traffic counts (2014). The September 2015 TDM was created utilizing standard practices to evaluate the data. It relied on industry-accepted data sources, developed in close coordination with local officials and best practices were used to evaluate outputs. The TDM analysis was performed for each of the alternatives, including the No-Build Alternative, both Passing Lane Alternatives, the Hybrid Alternative, and the 4-Lane Build On-Alignment Alternatives.

The September 2015 TDM analysis included many updates to the version of the TDM that was used to produce the July 2012 traffic forecasts. For example, the two versions of the TDM look at growth over different time periods: the 2015 TDM has a 2010 base year and 2045 future year, whereas the July 2012 TDM had a base year of 2005 and future year of 2035. The current 2015 TDM also has updated traffic analysis zone (TAZ) geography, trip rates, households per TAZ, employees per TAZ and other variables. So, while the September 2015 TDM analysis does not specifically demonstrate the impact of the 2014 DOA data, it does show the total impact from all the changes to the model since the last forecast was produced.

Appendix B, Table 6 shows the results of the September 2015 TDM analysis. The July 2012 final traffic forecasts used in the LS SFEIS/ROD are in Appendix B, Table 1. For the 4-Lane Build On-Alignment Alternative, the September 2015 TDM analysis showed similar results when compared to the July 2012 final traffic forecasts.

Preliminary Evaluation for Determining the Validity of the LS SFEIS/ROD

This preliminary analysis indicates that the conclusions in the ROD, based on traffic forecasts, would likely remain valid and that a revised ROD would not be necessary. The Court concluded that a decrease in the study's traffic forecasts would likely have an impact on the selection of alternatives as part of the NEPA process. One of the key requirements of any NEPA study is to define a project’s Purpose and Need. As part of any major proposed highway improvement project, WisDOT is required to demonstrate Purpose and Need – a process that plays a vital role in determining improvement alternatives including selection of a preferred alternative. This section will describe how WisDOT evaluated the criteria to determine how new information including traffic forecast information would

impact the WIS 23 study, what the preliminary results of that evaluations showed, and the proposed next steps in the project study.

Even though WisDOT concludes there was no reason to evaluate the new population projections in the context of the traffic forecasts, WisDOT chose to address the court's concern that:

> *"A significant reduction in traffic growth could, in turn, make one of the previously rejected passing-lane alternatives feasible."* [31]

Although traffic forecasts are important in the context of alternatives analysis, WisDOT has emphasized during the WIS 23 study that traffic forecasts and the resultant traffic operations are not the only factor in the consideration of alternatives. Eight Purpose and Need screening criteria were developed to compare and analyze alternatives[32]; forecasts are a component of only three of the eight criteria. The minor differences between the July 2012 forecasts and the new September 2015 TDM analysis indicate a limited effect on the study's alternatives screening and preliminary results show that this effect, would not change the selection of the preferred alternative.

Five alternatives were evaluated using the screening criteria:

- No-Build
- Passing Lane without Left-turn Lanes
- Passing Lane with Left-Turn Lanes
- Hybrid 4-Lane to County G, Passing Lane County G to County P
- 4-Lane Build On-Alignment

In both the LS SFEIS/ROD[33] and the September 2015 TDM analysis, the 4-Lane Build On-Alignment is the only alternative that fully meets the criteria[34]. WisDOT re-analyzed the Purpose and Need Screening Criteria for the new TDM analysis results and these are shown in Appendix C, Exhibit 2.

The existing highway (or No-Build alternative) does not meet any of the Purpose and Need screening criteria so it was only carried forward as a baseline in the project study.

The verification TDM analysis showed somewhat lower traffic volumes compared to the final traffic forecasts in the LS SFEIS/ROD[35] so the Passing Lane and Hybrid alternatives would meet additional screening criteria, but they still would not fully meet all of the criteria. The Passing Lane alternatives (with and without left turn lanes), have the same results because the TDM cannot distinguish whether or not left turn lanes exist.

---

[31] [[Slip op. p. 15]]
[32] AR 21947-21998
[33] AR 21997 and AR 21998
[34] AR 21997-21998
[35] AR 21418

With a decrease in the TDM analysis results described above, the Passing Lane alternatives result in improved traffic operations on WIS 23. Improved operations means meeting the Corridors 2030 (C2030) Connector Route goal for a Level-of-Service (LOS) C in the year 2035[36]. Improved operations also include opportunities for traffic to cross WIS 23 and to make left turns onto WIS 23. The TDM analysis showed minimal change in traffic forecast volumes compared to the July 2012 final traffic forecast for the passing lane alternatives. This shows a need for important safety countermeasures such as providing a median, J-turns or interchanges at higher use intersections. Some of the screening criteria are not affected by traffic forecast results. For those criteria, the results of the screening alternative analysis in the LS SFEIS/ROD would not change. The Passing Lane alternatives still would have limited passing lane opportunities to get around slow traffic, would not provide system continuity and would not reduce the number of conflict points by eliminating or combining private driveways, etc. The Passing Lane alternatives would only address a few private and public access points.

Using the TDM analysis, the Hybrid alternative has a LOS A in the four lane segment of WIS 23, but still operates below WisDOT's goal of LOS C for a C2030 Connector Route in the passing lane segment. In the four lane segment, safety countermeasures such as J-turns and interchanges could be implemented at higher use intersections. The passing lane segment of the Hybrid alternative does not allow for safety countermeasures that require a divided highway to be developed. It also would allow backups to form thereby limiting passing opportunities. Because there is no median, less opportunities to reduce, combine and/or change the access for private driveways and public roadways exist. The passing lane segment of the Hybrid alternative will have all the other limitations listed for the Passing Lane alternatives above.

The 4-Lane Build On-Alignment alternative is the only alternative that would sufficiently meet all the screening criteria and fully satisfy the project Purpose and Need[37]. In the terms of the screening criteria, the 4-Lane Build On-Alignment alternative[38]:

- Addresses truck traffic needs resulting from WIS 23's designation as a long truck route
- Provides system continuity - a consistent four lane highway – from Fond du Lac to Sheboygan
- Reduces travel time by providing effective passing opportunities allowing vehicles to travel at free flow speeds
- Provides more predictable travel by reducing the negative effect of slow-moving vehicles by providing additional lanes for passing
- Is consistent with or reflected in local land use and transportation plans in both the Fond du Lac and Sheboygan Area MPOs
- Is consistent with Wisconsin State Statute 84.013(3)(ra); more than five lane miles are added to WIS 23
- Improves WIS 23 to meet level of service goals for a C2030 Connector Route

[36] AR 21958
[37] This analysis is additionaly outlined in Appendix C: WIS 23 Alternative Summary Evaluation Matrix (TDM Analysis-September 2015).
[38] AR 21947-21998

- Provides a reasonable level of service for vehicles trying to access WIS 23
- Incorporates the appropriate design criteria for the roadway classification
- Reduces the number of left turns or crossing from side roads at public access points
- Reduces the number of private driveways
- Maps future access modifications such as overpasses and interchanges
- Improves WIS 23 mainline safety with countermeasures to address all major types of crashes (head on, sideswipe opposite direction, same direction sideswipe, rear end, and run off)
- Improves intersection safety with countermeasures including removing side road access, interchange or J-turn construction, and the provision of a median refuge for intersections throughout the corridor
- Provides accommodations for non-motorized travel

As a result of this verification analysis, the 4-Lane Build On-Alignment alternative is the only alternative that fully meets the Purpose and Need of the study. Although traffic forecasts are important in the context of alternatives analysis, traffic forecasts are not the only factor in the screening of alternatives. This preliminary analysis indicates that there would only be minor changes to the traffic forecasts, and therefore, the conclusions in the ROD based on traffic forecasts would remain valid. WisDOT and FHWA intend to more fully document this finding pursuant to 23 CFR s. 771.129(c).

Standard NEPA procedures will also be followed to document WisDOT's consideration of other environmental updates. These updates include an assessment of a newly recognized endangered species, the northern long-eared bat. Several statutory changes enacted as part of the 2015 State Budget Bill[39] including the impact to bicycle and pedestrian accommodations due to the repeal of ch. Trans 75, Wis. Adm. Code and changes to s. 84.063, Wis. Stats. The Budget Bill also revised community sensitive design provisions under s. 85.0205, Wis. Stats., which may impact this project. WisDOT and FHWA will also follow standard NEPA procedures to determine whether any other environmental updates are needed.

Conclusion

WisDOT completed a TDM analysis for this corridor in September 2015. Based on the preliminary analysis included in this Technical Memorandum, the September 2015 TDM analysis continues to support the selection of the 4-Lane Build On-Alignment Alternative. WisDOT and FHWA intend to more fully document this finding, and findings on other environmental updates, pursuant to standard NEPA procedures.

Recommendations from this Technical Memorandum

To address the Court's request on remand, this document has provided further clarification of WisDOT's forecasts. When combined with the LS SFEIS/ROD and the Administrative Record, this document demonstrates that WisDOT's forecasting practices were sound, that the tools produced were reasonable, and the methodologies used to analyze socio-economic data were complete. The July 2012

[39] 2015 Wis. Act 55

final traffic forecasts were appropriately prepared and analyzed for the LS SFEIS/ROD and support the selection of the 4-Lane Build On-Alignment alternative.

In conclusion, WisDOT and FHWA are requesting that the ROD be reinstated for the WIS 23 study project. Upon reinstatement of the ROD, WisDOT and FHWA intend to continue with the project pursuant to standard NEPA procedures, including documenting its findings regarding the September 2015 TDM analysis and several other environmental updates under 23 CFR s. 771.129(c).

APPENDICES

Appendix A: Calculations

Table 2: TDM Base 2012 Direct Output (Column D):

TDM Base 2012 Direct Output = (TDM Base 2005 Direct Output x ((((TDM Future Direct Output 2035-TDM Base 2005 Direct Output)/TDM Base 2005 Direct Output)/(Model Future Year-Model Base Year)) x (Count Year-Model Base Year)) + TDM Base 2005 Direct Output)

Column D = (Column C x ((((Column E-Column C)/Column C)/(2035-2005)) x (2012-2005)) + Column C)

Example calculation – TRADAS ID 201185
16,296 = (14,493 x ((((22,220-14,493)/14,493)/(2035-2005)) x (2012-2005))+14,493)

Table 2: TDM Average Growth Rate Calculation (Column F):

Growth Rate = ((TDM 2035 direct output – TDM base 2005 direct output)/TDM base 2005 direct output) / 30 yrs

Column F = ((Column E-Column C)/Column C)/30

Note: The period of growth is 30 years = Design Year – TDM base year or 2035-2005

Example calculation – TRADAS ID 201185
1.78% = ((22,220-14,493)/(14,493)/30 yrs)

Table 2: TDM Ratio Adjustment Method Calculation (Column G):

2035 Ratio Adjusted Forecast = (2012 Count/TDM base 2012 direct output) x 2035 future direct output

Column G = (Column B/Column D) x Column E

Example calculation – TRADAS ID 201185
16,635 = (12,200/16,296) x 22,220

Table 2: TDM Difference Adjustment Method Calculation (Column H):

2035 TDM Difference Adjusted Forecast= (2012 Count - TDM base 2012 direct output) + 2035 future direct output

Column H = (Column B – Column D) + Column E

Example calculation – TRADAS ID 201185
18,124 = (12,200 – 16,296) + 22,220

Table 2: TDM_EST Average of Difference Adjustment and Ratio Adjustment Method (Column I):

Adjustment = (TDM Ratio Adjustment + TDM Difference Adjustment)/2

Column I = (Column G + Column H)/2

Example calculation – TRADAS ID 201185
17,380 ~ 17,381 = (16,635 + 18,124)/2

Table 3: No Build Forecast Growth Rate Calculation (Column E):

Growth Rate = ((July 2012 Final No Build Forecast 2035 - June Count 2012)/June Count 2012) / 23 yrs

Column E = ((Column D-Column C)/(Column C)/23)

Note: The period of growth is 23 years = Design Year – June Count 2012 or 2035-2012

Example calculation – TRADAS ID 201185
1.85% = ((17,400-12,200)/(12,200)/23 yrs)

Table 3: 4-Lane Build On-Alignment Forecast Growth Rate Calculation (Column G):

Growth Rate = ((July 2012 Final 4-Lane Build On-Alignment Forecast 2035 - June Count 2012)/June Count 2012) / 23 yrs

Column G = ((Column F – Column C)/(Column C)/23)

Note: The period of growth is 23 years = Design Year – June Count 2012 or 2035-2012

Example calculation – TRADAS ID 201185
1.71% = ((17,000-12,200)/(12,200)/23 yrs)

Table 3: AADT if Min 0.5% to 2035 Calculation (Column H):

2035 AADT = ((June Count 2012 x 0.5%) x 23 yrs) + June Count 2012

Column H = ((Column C x 0.5%) x 23) + Column C

Note: The period of growth is 23 years = Design Year – June Count 2012 or 2035-2012

Example calculation – TRADAS ID 201185
13,600 = ((12,200 x 0.5%) x 23 yrs) + 12,200

Table 3: AADT if Max 5.0% to 2035 Calculation (Column I):

2035 AADT = ((June Count 2012 x 5.0%) x 23 yrs) + June Count 2012

Column I = ((Column C x 5.0%) x 23) + Column C

Note: The period of growth is 23 years = Design Year – June Count 2012 or 2035-2012

Example calculation – TRADAS ID 201185
26,200 = ((12,200 x 5.0%) x 23 yrs) + 12,200

Table 4: 10% Check Example Calculations:

10% of the AADT = ((March 2012 estimated TAFIS x 10%) + March 2012 estimated TAFIS)

Example calculation – TRADAS ID 200219
13,090 = ((11,900 x 10%) + 11,900)
11,070 = ((12,300 x 10%) + 12,300)

10% of the average of an AADT = [((March 2012 estimated TAFIS x 10%) + March 2012 estimated TAFIS) + ((July 2012 TDM x 10%) + July 2012 TDM)]/2

Example calculation – TRADIS ID 201185
16,300 = [((15,200 x 10%) + 15,200) + ((17,400 x 10%) + 17,400)]/2

16,300 > 15,660, so it is within 10% of TDM

Table 5: Estimated TAFIS Average Growth Rate Calculation:

Growth Rate = ((TAFIS Future 2035-TAFIS Base 2012)/TAFIS Base 2012) / 23 yrs
Note: The period of growth is 23 years = Design Year – TAFIS Base Count or 2035-2012

Example calculation – TRADAS ID 201185
1.95% = ((15,200-10,500)/(10,500)/23 yrs)

Appendix B: Tables

Table 1: WIS 23 Final Traffic Forecasts for the year 2035 (July 2012) for all Alternatives

Count Site Termini TRADAS ID	Traffic Count June 2012 AR 21374, AR 21943	No Build 2035 AR 21374 AR 21943	Passing Lane without Left-turn Lanes 2035 AR 21943	Passing Lane with Left-turn Lanes and Median Refuges 2035 AR 21943	Hybrid 4-lane to CTH G Passing Lane CTH G to CTH P 2035 AR 21943	4-Lane Build On-Alignment 2035 AR 21374, AR 21943
US 151 – CTH K 201185	12,200	17,400	16,000	16,000	16,300	17,000
CTH K – CTH UU 200219	11,100	12,300	13,100	13,100	13,600	14,200
CTH UU – Hinn Rd 206104	8,800	10,800	11,000	11,000	11,500	11,900
Hinn Rd – CTH W 200222	8,800	9,500	11,000	11,000	11,500	11,900
CTH W – CTH G 200224	8,100	9,100	9,700	9,700	10,400	11,000
CTH G – CTH A 590118	7,600	8,500	9,100	9,100	9,400	10,200
CTH A – CTH P 591421/590195*	8,000/ 9,500	10,400	10,700	10,700	11,200	12,000

Table 1: WIS 23 Final Traffic Forecasts for the year 2035 (July 2012) for all Alternatives

Notes: All sites in this table refer to locations on WIS 23 and are in Appendix C, Exhibit 1.

*Sites 591421 and 590195 share the same segment in the TDM.

Table 2: TDM Forecast "Raw Assignment" Direct Output Adjustments to "No Build" Forecast for year 2035, conducted in July 2012

A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
Count Site Termini TRADAS ID	June 2012 Count AR 21374 AR 21943*	TDM Base 2005 Direct Output AR 22683	TDM Base 2012 Direct Output	TDM future Direct Output 2035 AR 22683	TDM Ave Growth Rate (%)	TDM Ratio Adjust-ment 2035	TDM Differ-ence Adjust-ment 2035	TDM Average of Diff./Ratio Adjust-ment 2035	LS SFEIS/ ROD July 2012- Final Forecast 2035 AR 21374 AR 21943
US 151 – CTH K 201185	12,200	14,493	16,296	22,220	1.78%	16,635	18,124	17,380	17,380 (17,400)
CTH K – CTH UU 200219	11,100	12,976	13,363	14,633	0.43%	12,155	12,370	12,263	12,263 (12,300)
CTH UU – Hinn Rd 206104	8,800	12,407	13,019	15,029	0.70%	10,159	10,810	10,484	10,810 (10,800)
Hinn Rd – CTH W 200222	8,800	13,108	13,323	14,030	0.23%	9,267	9,507	9,387	9,507 (9,500)
CTH W – CTH G 200224	8,100	12,357	12,647	13,599	0.34%	8,710	9,052	8,881	9,052 (9,100)
CTH G – CTH A 590118*	7,600	11,695	11,973	12,886	0.34%	8,180	8,513	8,346	8,513 (8,500)
CTH A – CTH P 590195/ 591421*	9,500/ 8,000	12,035	12,298	13,162	0.31%	10,167	10,364	10,266	10,364 (10,400)

Table 2: TDM Forecast "Raw Assignment" Direct Output Adjustments to "No Build" Forecast for year 2035, conducted in July 2012

Notes: Highlighting indicates where the forecaster selected the difference adjustment or average of difference and ratio adjustments.

All sites in this table refer to locations on WIS 23.

*Sites 59142 and 590195 share the same segment in the TDM.

Additional calculations are in Appendix A: Calculations. Count Site Locations are in Appendix C, Exhibit 1.

Table 3: TDM Forecast Growth Rates and WisDOT Policy Minimum and Maximum Growth Rate Comparisons for WIS 23 "No Build" and "4-Lane Build On-Alignment" Traffic Forecasts for the Year 2035 Conducted in July 2012

A.	B.	C.	D.	E.	F.	G.	H.	I.
Count Site Termini TRADAS ID	TRADAS ID	June Count 2012 AR 21943 (rounded)	July 2012 Final No Build Forecast 2035 AR 21943	No Build Forecast Growth Rate (%)	July 2012 Final 4-Lane Build On-Alignment Forecast 2035 AR 21943	4-Lane Build On-Alignment Forecast Growth Rate (%)	AADT if Min 0.5% to 2035*	AADT if Max 5.0% to 2035*
US 151- CTH K (1.0 miles)	201185	12,200	17,400	1.85%	17,000	1.71%	13,600	26,200
CTH K – CTH UU (1.3 miles)	200219	11,100	12,300	0.47%	14,200	1.21%	12,400	23,900
CTH UU – Hinn Rd (5.0 miles)	206104	8,800	10,800	0.99%	11,900	1.53%	9,800	18,900
Hinn Rd – CTH W (0.5 miles)	200222	8,800	9,500	0.35%	12,000	1.58%	9,800	18,900
CTH W – CTH G (4.2 miles)	200224	8,100	9,100	0.54%	11,000	1.56%	9,000	17,400
CTH G – CTH A (5.1 miles)	590118	7,600	8,500	0.51%	10,200	1.49%	8,500	16,300
CTH A – CTH P (2.9 miles)	591421	8,000	N/A	N/A	N/A	N/A	8,900	17,200
CTH A – CTH P (same 2.9 miles)	590195	9,500	10,400	0.41%	12,000	1.14%	10,600	20,400

Table 3: TDM Forecast Growth Rates and WisDOT Policy Minimum and Maximum Growth Rate Comparisons for WIS 23 "No Build" and "4-Lane Build On-Alignment" Traffic Forecasts for the year 2035 conducted in July 2012

***As discussed in AR 21927**

Notes: All the sites in this table refer to locations on WIS 23.

Site 590195 and 591421 shared the same segment in the TDM.

N/A means traffic count was not available.

Additional calculations are in Appendix A: Calculations. Count Site Locations are in Appendix C, Exhibit 1.

Table 4: Traffic Forecast Results Compared

	January 2012 Comparison – TDM vs. TAFIS (used in January 2012 Forecast)			February 2012 Comparison TDM vs. Estimated TAFIS (used in February 2012 Forecast)		March 2012 Estimated TAFIS	July 2012 Environmental Document Final Traffic Forecasts	
A.	B.	C.	D.	E.	F.	G.	H.	I.
Count Site Termini TRADAS ID	TDM No Build 2035 (using 2011 base counts) (AR 23455)	TDM 4-Lane Build 2035 (AR 23455)	TAFIS (using 2008 base, adjusted to 2011 base) 2035 (AR 23455)	TDM No Build (using 2011 base counts) 2035 (AR 22477)	Estimated TAFIS (using 2011 base counts) 2035 (AR 22477)	Estimated TAFIS 2035 (using Feb 2012 base counts) (AR 14870)	July 2012 Final No Build Forecast 2035 (using June 2012 base counts) (AR 21943)	July 2012 Final 4-Lane Build On-Alignment 2035 (AR 21943)
US 151-CTH K 201185	16,317	18,347	18,200	16,300	15,600	15,200	17,400	17,000
CTH K – CTH UU 200219	11,693	14,327	16,300	11,700	12,100	11,900	12,300	14,200
CTH UU – Hinn Rd 206104	9,256	11,511	11,000	9,300	9,500	9,500	10,800	11,900
Hinn Rd – CTH W 200222	8,515	10,409	12,000	8,500	9,100	9,200	9,500	11,900
CTH W – CTH G 200224	7,475	9,075	10,600	7,500	8,200	8,500	9,100	11,000
CTH G – CTH A 590118*	6,589	8,111	10,100	6,600	7,200	7,600	8,500	10,200
CTH A – CTH P 591421*	7,457	8,966	10,800	N/A	N/A	N/A	N/A	N/A
CTH A – CTH P 590195/ 591421	7,844	9,291	12,300	7,800	8,600	8,800	10,400	12,000

Table 4: **TDM and TAFIS Results Comparisons Conducted in 2012**
Notes: All the sites in this table refer to locations on WIS 23.
Site 590195 and 591421 shared the same segment in the TDM.
N/A means traffic count was not available.
10% Check Calculations are in Appendix A: Calculations. Count Site Locations are in Appendix C, Exhibit 1.

Table 5: Estimated TAFIS "No Build" March 2012 Traffic Forecasts

Count Site Termini TRADAS ID	Traffic Count Feb. 2012/ Estimated TAFIS Base 2012	Estimated TAFIS Future 2035 AR 14870	Estimated TAFIS Growth Rate (%)
US 151 – CTH K 201185	10,500	15,200	1.95 %
CTH K – CTH UU 200219	9,400	11,900	1.16 %
CTH UU – Hinn Rd 206104	7,500	9,500	1.16 %
Hinn Rd – CTH W 200222	7,700	9,200	0.85 %
CTH W – CTH G 200224	7,100	8,500	0.86 %
CTH G – CTH A 590118	6,400	7,600	0.82%
CTH A – CTH P 591421	N/A	N/A	N/A
CTH A – CTH P 590195	7,400	8,800	0.82 %

Table 5: Estimated TAFIS "No Build" March 2012 Traffic Forecast

Notes: All the sites in this table refer to locations on WIS 23.

Site 590195 and 591421 shared the same segment in the TDM.

N/A means traffic count was not available.

The growth rate calculation is in Appendix A: Calculations. Count Site Locations are in Appendix C, Exhibit 1.

March 2012 estimated TAFIS 2035 from AR 14870

Table 6: TDM Analysis-September 2015

Count Site Termini TRADAS ID	Traffic Count June 2014	No Build 2035	Passing Lane w/o Left Turn Lanes 2035	Passing Lane w/Left Turn Lanes and Median Refuges 2035	Hybrid 4-lane to CTH G Passing Lane CTH G to CTH P 2035	4-Lane Build On-Alignment 2035
US 151 – CTH K 201185	11,700	13,500	13,700	13,700	15,100	15,800
CTH K – CTH UU 200219	10,700	11,900	12,000	12,000	13,900	15,300
CTH UU – Hinn Rd 206104	7,700	8,500	8,600	8,600	10,600	12,000
Hinn Rd – CTH W 200222	8,200	9,100	9,100	9,100	10,700	11,600
CTH W – CTH G 200224	7,300	8,100	8,100	8,100	9,300	10,800
CTH G – CTH A 590118	6,700	7,400	7,400	7,400	8,600	10,000
CTH A – CTH P 591421/590195	8,800	9,800	9,800	9,800	10,900	12,300

Table 6: September 2015 TDM Analysis

Notes: All sites in this table refer to locations on WIS 23.

Sites 591421 and 590195 shared the same segment in the TDM

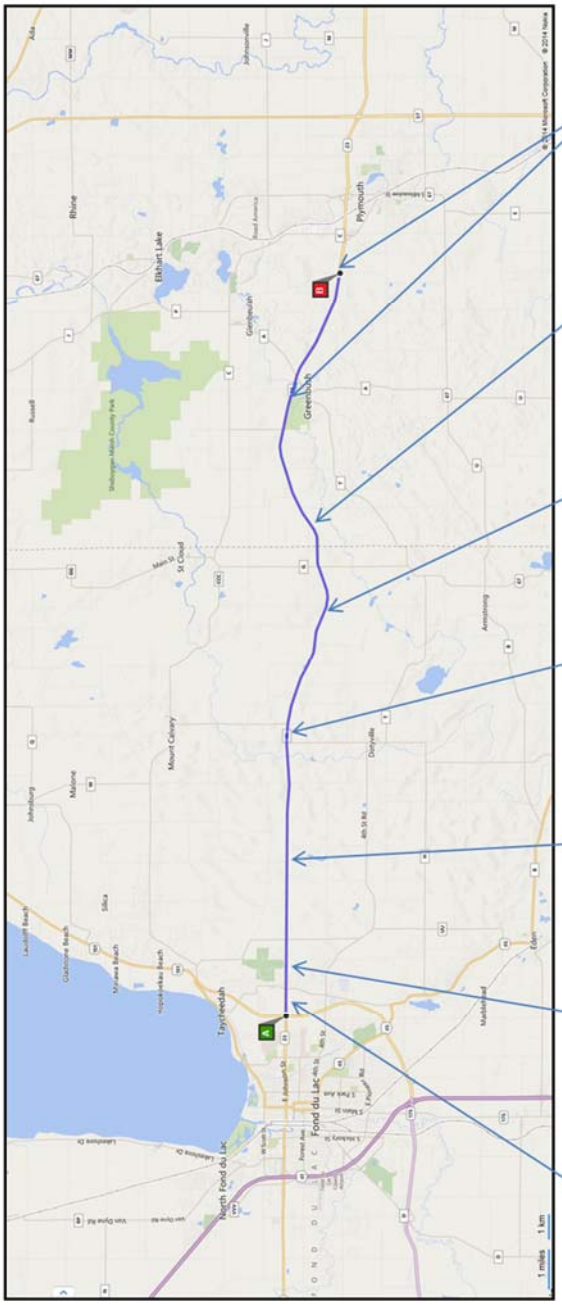
Count Site Locations are in Appendix C, Exhibit 1.

Appendix C: Exhibits

Exhibit 1: WIS 23 Project Map-Approximate locations of TRADAS Site locations and distances between them.

WIS 23 Project Map

Approximate locations of TRADAS Site locations and distances between them



TRADAS ID 201185- BTWN Wisconsin American Dr & CTH K (USH 151-CTH K) **1.0 miles**

TRADAS ID 200219- East of CTH K (CTH K-CTH UU) **1.3 miles**

TRADAS ID 206104- West of CTH W South Forest-HPMS (CTH UU-Hinn Rd) **5.0 miles**

TRADAS ID 200222- West of CTH W to the North (Hinn Rd-CTH W) **0.5 miles**

TRADAS ID 200224- Btwn Triple L & Hillview Rds Forest TNSHP-HPMS (CTH W-CTH G) **4.2 miles**

TRADAS ID 590118- Btwn Division Rd & Chickadee Dr Greenbush TNSHP-HPMS (CTH G-CTH A) **5.1 miles**

TRADAS ID 591421/590195*- West of CTH P Plymouth TNSHP (CTH A-CTH P) **2.9 miles**

*All the sites in this exhibit refer to locations on WIS 23. Site 590195 and 591421 shared the same segment in the travel demand model.

Exhibit 2: WIS 23 Alternative Summary Evaluation Matrix (TDM Analysis-September 2015) –SEE Pages 33-35

WIS 23 Alternative Summary Evaluation Matrix (TDM Analysis-September 2015) 12-15-2015

	No-Build Alternative		Passing Lane without Left-turn Lanes		Passing Lane with Left-turn Lanes		Hybrid 4-Lane to County G, 2-Lane County G to County P		4-Lane Build On-alignment	
Schematic										
Improvement Type	• No improvements other than preservation and maintenance		• Adds 2 passing lanes for westbound travel and 2 passing lanes for eastbound travel. • Upgrades sideroad intersections • Jughandle intersection at County K • No median • No left-turn lanes		• Adds 2 passing lanes for westbound travel and 2 passing lanes for eastbound travel. • Upgrades sideroad intersections • Jughandle intersection at County K • No median • Left-turn lanes at Tower Rd, 7 Hills Rd, County W South, County W north, County G, County U, County T, County A, and County S. (Left turn lanes reduce the amount of passing availability.)		• Provide 4-lane divided highway for the 12 miles from US 151 to County G • 2-lane roadway for 7 miles from County G to County P. • Adds 1 passing lane for westbound travel and 1 passing lane for eastbound travel east of County G.. • Jughandle intersection at County K • Diamond interchanges at County UU and County G.		• Provide 4-lane divided highway for the 12 miles from US 151 to County G • 2-lane roadway for 7 miles from County G to County P. • Adds 1 passing lane for westbound travel and 1 passing lane for eastbound travel east of County G.. • Jughandle intersection at County K • Diamond interchanges at County UU and County G.	
Official Mapping	• No official mapping		• Future right of way for interchanges and overpasses will be officially mapped		• Future right of way for interchanges and overpasses will be officially mapped		• Future right of way for interchanges and overpasses will be officially mapped		Future right of way for interchanges and overpasses will be officially mapped	
Bike Accommodations	• No bike accommodations other than paved shoulders		• Bike accommodations through paved shoulder or extension of the Old Plank Road multi-use path.		• Bike accommodations through paved shoulder or extension of the Old Plank Road multi-use path.		• Bike accommodations through paved shoulder or extension of the Old Plank Road multi-use path.		• Bike accommodations through extension of the Old Plank Road multi-use path.	
Forecast	**County UU to County G**	**County G to Couty P**	**County UU to County G**	**County G to Couty P**	**County UU to County G**	**County G to Couty P**	**County UU to County G**	**County G to Couty P**	**County UU to County G**	**County G to Couty P**
2012 Forecast Average 2035 AADT	10,300	9,350	10,860	9,800	10,860	9,800	11,450	10,210	11,980	11,010
2015 TDM Analysis Average 2035 AADT	**9,050**	**8,370**	**9,100**	**8,370**	**9,100**	**8,370**	**10,710**	**9,530**	**12,130**	**10,930**
Traffic Operations - Mainline Apha LOS Numeric LOS (A = 1.01-2.0, B=2.01 to 3.0, C=3.01 to 4.0, D=5.01 to 5.0, E= 5.01 to 6.0, F>6.01) 2030 Connector Route-Desirable LOS C (4.0) or better										
WB 2035 Traffic Operations 2012 Forecast	D 4.91	D 4.81	D 4.22	D 4.23	D 4.30	D 4.41	A	D 4.28	A	A
WB 2035 Traffic Operations 2015 TDM Analysis	**D 4.86**	**D 4.69**	**C 3.99**	**C 3.93**	**D 4.09**	**D 4.13**	**A**	**D 4.19**	**A**	**A**
EB 2035 Traffic Operations 2012 Forecast	D 4.89	D 4.76	D 4.25	D 4.27	D 4.33	D 4.41	A	D 4.31	A	A
EB 2035 Traffic Operations 2015 TDM Analysis	**D 4.85**	**D 4.63**	**D 4.01**	**C 3.97**	**D 4.11**	**D 4.13**	**A**	**D 4.23**	**A**	**A**
Travel Speeds (MPH) – 55 MPH Speed Zone										
WB 2035 Travel Speeds 2012 Forecast MPH	45.4	46.2	46.0	46.6	45.7	46.1	60	46.2	60	60
WB 2035 Travel Speeds 2015 TDM Analysis MPH	**46.2**	**46.8**	**47.2**	**47.7**	**46.8**	**47.0**	**60**	**46.9**	**60**	**60**
EB 2035 Travel Speeds 2012 Forecast MPH	45.4	46.4	45.9	46.6	45.6	46.2	60	46.2	60	60
EB 2035 Travel Speeds 2015 TDM Analysis MPH	**46.2**	**47.0**	**47.1**	**47.7**	**46.8**	**47.2**	**60**	**46.9**	**60**	**60**
No Build Travel Time - or Difference from No Build Travel Time County UU to County P (Minutes:Seconds)										
WB 2035 Travel Time 2012 Forecast	23:17		-0:15		-0:04		-3:08		-5:32	
WB 2035 Travel Time 2015 TDM Analysis MPH	**22:56**		**-0:28**		**-0:12**		**-2:56**		**-5:10**	
EB 2035 Travel Time 2012 Forecast	23:15		-0:11		-0:01		-3:05		-5:29	
EB 2035 Travel Time 2015 TDM Analysis	**22:53**		**-0:24**		**-0:12**		**-2:53**		**-5:08**	

Notes:

- Yellow highlighted cells indicate a change in the LOS from the 2035 Traffic Operations Results (based on the 2012 Forecast) to the 2035 Traffic Operations Results (based on the 2015 TDM Analysis)
- This table is explained in detail in AR 21365-21444

WIS 23 Alternative Summary Evaluation Matrix (TDM Analysis-September 2015) 12-15-2015

	No-Build Alternative	Passing Lane without Left-turn Lanes	Passing Lane with Left-turn Lanes	Hybrid 4-Lane to County G, 2-Lane County G to County P	4-Lane Build On-alignment
Schematic					

Purpose and Need Screening Criteria	**2015 TDM Analysis Answer** / 2012 Forecast Answer				
1. System Linkage and Route Importance					
a. Does the alternative adequately address truck traffic needs resulting from WIS 23's designation as a long truck route?	**No** / No There are limited opportunities for passing and few climbing lanes.	**Partially** / Partially There are more opportunities for passing and the dispersal of platoons.	**Partially** / Partially There are more opportunities for passing and the dispersal of platoons.	**Partially** / Partially The 4-lane portion from US 151 to County G keeps platoons from forming. East of County G there are more opportunities for passing yet platoons still form.	**Yes** / Yes Additional through lanes keep platoons from forming.
b. Does the alternative provide system continuity?	**No** / No The US 151 and WIS 23 Connector from Fond du Lac to Sheboygan is a mixture of 2-lane and 4-lane facility types.	**No** / No WIS 23 Connector from Fond du Lac to Sheboygan remains a mixture of 2-lane, passing lane and 4-lane facility types.	**No** / No WIS 23 Connector from Fond du Lac to Sheboygan remains a mixture of 2-lane, passing lane and 4-lane facility types.	**No** / No WIS 23 Connector from Fond du Lac to Sheboygan remains a mixture of 2-lane, passing lane and 4-lane facility types.	**Yes** / Yes WIS 23 Connector from Fond du Lac to Sheboygan has a consistent 4-lane facility type from Fond du Lac to Sheboygan.
2. Transportation Demand/ Regional Economic Development					
a. Does the alternative reduce travel time?	**No** / No Average speed at 2035 peak hours is 46 mph.	**No** / No Average speed at 2035 peak hours is almost 48 mph with a travel time savings over the No-Build alternative of between **24 and 28 seconds.***	**No** / No Average speed at 2035 peak hours is almost **47** mph with a travel time savings over the No-Build alternative of about **12 seconds.**	**Partially** / Partially The 4-lane section provides free flow speeds. The County G to County P section will continue to have 2035 average speeds of just under **47 mph** during peak periods. Travel times savings over the No-Build alternative during 2035 peak periods is **between 2:53 and 2:56.**	**Yes** / Yes A full 4-lane facility provides free flow speeds throughout the corridor. Travel times savings over the No-Build alternative during 2035 peak periods is between **5:08 and 5:10.**
b. Does the alternative provide for more predictable travel?	**No** / No Traffic is impeded by slow moving agricultural, truck, and recreational vehicles.	**No** / No Passing lanes are available for 4 of the 36 lane miles, requiring vehicles to look for gaps in the opposing travel stream to travel around slow moving vehicles.	**No** / No Passing lanes are available for 4 of the 36 lane miles, requiring vehicles to look for gaps in the opposing travel stream to travel around slow moving vehicles.	**Partially** / Partially For approximately 24 of the 36 lane mile there is opportunity to pass slow moving vehicles	**Yes** / Yes A 4-lane facility provides the opportunity for high speed traffic to travel around slow moving vehicles.
3. Legislative and Transportation Planning History					
a. Is the alternative consistent with and/or reflected in local land use and transportation plans?	**No** / No Contradicts MPO long range plans.	**Partially** / Partially Improves the mobility of WIS 23, yet does not provide the 4-lane expansion mentioned in the MPO plans.	**Partially** / Partially Improves the mobility of WIS 23, yet does not provide the 4-lane expansion mentioned in the MPO plans.	**Partially** / Partially Improves the mobility of WIS 23 and provides the 4-lane expansion discussed in the Fond du Lac Area MPO plan. It does not contain the 4-lane expansion discussed in the 2035 update to the Sheboygan Area Plan.	**Yes** / Yes Improvement is consistent with that mentioned in both the Fond du Lac Area MPO and Sheboygan Area MPO plans
b. Is the alternative consistent with Wisconsin State Statute 84.013(3)(ra)?	**No** / No Does not add 5 lane miles to WIS 23 corridor.	**Partially** / Partially Does not add one or more lanes of highway for at least 5 miles, but does address roadway significance with passing lanes.	**Partially** / Partially Does not add one or more lanes of highway for at least 5 miles, but does address roadway significance with passing lanes	**Yes** / Yes More than 5 lane miles are added to WIS 23.	**Yes** / Yes More than 5 lane miles are added to WIS 23.
4. Existing and Future Traffic Volumes and Resulting Operations					
a. Does the alternative improve WIS 23 mainline operational efficiency and mobility by meeting LOS requirements of a Corridors 2030 Connector Route? (Goal = LOS C in 2035 or numeric LOS of less than 4.0 in 2035)	**No** / No WIS 23 mainline operates at LOS D before 2035.	**Yes**[1] / No Westbound and eastbound WIS 23 for both segments of the corridor essentially **operate at LOS C.**[1]	**No** / No Westbound and eastbound WIS 23 for both segments of the corridor operate at LOS D in 2035.	**Partially** / Partially County UU to County G operates at LOS A in 2035. Westbound and eastbound WIS 23 from County G to County P (the end with passing lanes) operate at LOS D in 2035.	**Yes** / Yes WIS 23 mainline will operate at LOS A in both directions in 2035.
b. Does the alternative provide a reasonable LOS for vehicles trying to access WIS 23? (WisDOT seeks to provide an LOS D at all intersections. The more highly used intersections of County G, County UU, and County W provide a metric of how well this criterion is satisfied.)	**No** / No The left-turn and through movements at major intersections are, or soon will be, experiencing substantial delays.	**No** / No Multiple side-road movements operate **at LOS E or worse in 2035.**	**No** / No Multiple side-road movements operate at LOS E or worse in 2035.	**Yes** / Yes Side road movements will operate at LOS C or better in 2035.	**Yes** / Yes Side road movements will operate at LOS C or better in 2035.

Notes:

- Yellow highlighted cells indicate a change in the LOS from the 2035 Traffic Operations Results (based on the 2012 Forecast) to the 2035 Traffic Operations Results (based on the 2015 TDM Analysis)
- This table is explained in detail in AR 21365-21444

[1] Note that 2035 EB operations from County UU to County G technically operate at 4.01, which exceeds the less than 4.0 threshold for LOS C. Because the value is so near the threshold, it is characterized as meeting this criterion.

* Depending on direction

WIS 23 Alternative Summary Evaluation Matrix (TDM Analysis-September 2015) 12-15-2015

	No-Build Alternative	Passing Lane without Left-turn Lanes	Passing Lane with Left-turn Lanes	Hybrid 4-Lane to County G, 2-Lane County G to County P	4-Lane Build On-alignment
Schematic					
5. Highway Geometry					
a. Does the alternative incorporate the appropriate design criteria for the roadway classification?	**No** / No Shoulder widths are substandard	**Yes**[1] / Partially Roadway is reconstructed to standards for Design Class A2. **The cross section is just able to maintain LOS C in 2035.**[1]	**Partially** / Partially Roadway is reconstructed to standards for Design Class A2, yet cross section is not able to maintain LOS C in 2035.	**Partially** / Partially Roadway is reconstructed to standards for Design Class A3 (4-lane) and A2 (2-lane) , yet east portion cross section is not able to maintain LOS C in 2035..	**Yes** / Yes Roadway is reconstructed to standards for Design Class A3
6. Access Management					
a. Does the alternative reduce the number of hazardous movements (left turns or crossing from sideroads) at public access points through the installation of access restrictions or interchanges?	**No** / No All existing intersections remain.	**No** / No All existing intersections remain except for 5 intersections in the Fond du Lac urban area.	**No** / No All existing intersections remain except for 5 intersections in the Fond du Lac urban area. Some intersections are improved with the used of left turn lanes.	**Partially** / Partially All intersections from County K to County G are improved, limited, or removed. From County G to County P all intersections remain.	**Yes** / Yes All intersections except for five low volume intersections are improved, limited, or removed.
b. Does the alternative reduce the number of private access points through right of way acquisition?	**No** / No Private access points remain	**Partially** / Partially Some private access points removed	**Partially** / Partially Some private access points removed	**Partially** / Partially Many private access points removed from County K to County G. Some private access points removed from County G to County P.	**Yes** / Yes Many private access points removed from County K to County P
c. Does the alternative designate and preserve land for future access modifications, such as overpasses and interchanges, through official mapping?	**No** / No	**Yes** / Yes	**Yes** / Yes	**Yes** / Yes	**Yes** / Yes
7. Improve Safety					
a. Does the alternative adequately address WIS 23 mainline safety?	**No** / No No safety countermeasures are introduced.	**Partially** / Partially Countermeasures introduced address only run off and same direction sideswipe type crashes.	**Partially** / Partially Countermeasures introduced address run off, rear end, and same direction sideswipe type crashes.	**Yes** / Yes From County K to Conty G countermeasures introduced address all major type of crashes (head on, sideswipe opposite direction, same direction sideswipe, rear end, and run off). From County G to County P, countermeasures introduced address only run off and same direction sideswipe type crashes	**Yes** / Yes Countermeasures introduced address all major type of crashes (head on, sideswipe opposite direction, same direction sideswipe, rear end, and run off).
b. Does the alternative address intersection safety? (eg the reduction of angle crashes)	**No** / No No safety countermeasures are introduced.	**No** / No No safety countermeasures are introduced for angle crashes	**Partially** / Partially A median refuge is provided for vehicles making a left or crossing maneuver from a side road. No other safety countermeasures are introduced for angle crashes.	**Partially** / Partially This alternative provides countermeasures that include removing street access, interchange or J-turn construction, and the provision of a median refuge for intersections from USH 151 to County G	**Yes** / Yes This alternative provides countermeasures that include removing side road access, interchange or J-turn construction, and the provision of a median refuge for intersections throughout the corridor.
8. Accommodations for Non-motorized Travel					
a. Does the alternative provide accommodations for non-motorized travel?	**No** / No No additional accommodations are provided for non-motorized users.	**Yes** / Yes Paved shoulders allow cyclist to ride adjacent to traffic. A separate trail could be constructed if additional right of way is purchased.	**Yes** / Yes Paved shoulders allow cyclist to ride adjacent to traffic. A separate trail could be constructed if additional right of way is purchased.	**Yes** / Yes County K to County G has separate trail for non-motorized users. County G to County P has paved shoulders that allow cyclist to ride adjacent to traffic. A separate trail could be constructed if additional right of way is purchased.	**Yes** / Yes Separate trail for non-motorized users is provided.
Summary					
	With the revised traffic forecasts, the No Build continues to not satisfy the purpose and need screening criteria.	With the revised traffic forecast, the Passing Lane Alternative <u>w/o left turn lanes</u> is able to satisfy two additional criterion - mainline operations and geometry. Even with this improvement, other alternatives satisfy more criterion and better meet the purpose and need.	With the revised traffic forecasts, the Passing Lane Alternative w/ left turn lanes provides better mainline operations, yet they remain at LOS D. The answers to the screening criteria remain unchanged.	With the revised traffic forecasts, the Hybrid Alternative provides better mainline operations, yet they remain at LOS D in the east half of the corridor. The answers to the screening criteria remain unchanged.	With the revised traffic forecasts, the 4-lane Build on-alignment alternative continues to satisfy all of the purpose and need screening criteria and best meets the purpose and need.

Note:

- This table is explained in detail in AR 21365-21444

Appendix D: Administrative Records

Administrative Record 14659-SEE Page 37

ID	Road	Tradas Count	Year	Model Count	Existing EST 2035	Existing	Existing	Adjustment	Tafis 2035	No Build EST 2020	No Build 2020	No Build 2020		No Build 2015	2025	2035	Tradas Count	2011-2015	2015-2025	2025-2035
201185	STH 23	11100	2011	12500	19844	1.96%	16,317	(3,527)	18200	17533	2.68%	13,782	1.23%	11,645	14,627	16,317	11100	1.23%	2.56%	1.16%
200219	STH 23	10000	2011	8600	10420	0.71%	11,693	1,273	16300	9282	0.53%	10,476	0.77%	10,310	10,882	11,693	10000	0.77%	0.55%	0.75%
206104	STH 23	7600	2011	6900	8779	0.91%	9,256	477	11000	7561	0.64%	8,037	1.01%	7,907	8,443	9,256	7600	1.01%	0.68%	0.96%
200222	STH 23	7300	2011	7800	9423	0.69%	8,515	(908)	12000	8300	0.43%	7,581	0.82%	7,540	7,892	8,515	7300	0.82%	0.47%	0.79%
200224	STH 23	6700	2011	8600	9843	0.48%	7,475	(2,368)	10600	6625	-1.53%	5,777	1.96%	7,225	6,343	7,475	6700	1.96%	-1.22%	1.78%
590118	STH 23	5800	2011	7000	8190	0.57%	6,589	(1,601)	10100	7207	0.20%	5,903	0.77%	5,980	6,132	6,589	5800	0.77%	0.25%	0.75%
591421	STH 23	6400	2011	8600	10375	0.69%	7,457	(2,918)	10800	9156	0.43%	6,648	0.81%	6,608	6,918	7,457	6400	0.81%	0.47%	0.78%
590195	STH 23	7100	2011	8600	9727	0.44%	7,844	(1,883)	12300	8780	0.14%	7,189	0.61%	7,273	7,408	7,844	7100	0.61%	0.19%	0.59%
590197	STH 23	9400	2011	9500	11066	0.55%	10,640	(426)	15400	9633	0.09%	9,479	0.82%	9,707	9,866	10,640	9400	0.82%	0.16%	0.78%
					Build EST 2035	Build	Build			Build EST 2020	Build 2020			Build 2015	2025	Build		2011-2015	2015-2025	2025-2035
201185	STH 23	11100	2011	12500	22701	2.72%	18,347	(4,354)	18200	19967	3.98%	15,078	1.45%	13,989	16,168	18,347	11100	6.51%	1.56%	1.35%
200219	STH 23	10000	2011	8600	13252	1.80%	14,327	1,075	16300	11571	2.30%	12,073	1.25%	11,321	12,824	14,327	10000	3.30%	1.33%	1.17%
206104	STH 23	7600	2011	6900	11339	2.14%	11,511	172	11000	9584	2.59%	9,374	1.52%	8,661	10,086	11,511	7600	3.49%	1.65%	1.41%
200222	STH 23	7300	2011	7800	11953	1.77%	10,409	(1,544)	12000	10301	2.14%	8,704	1.31%	8,136	9,273	10,409	7300	2.86%	1.40%	1.23%
200224	STH 23	6700	2011	8600	12411	1.48%	9,075	(3,336)	10600	10888	1.77%	7,770	1.12%	7,334	8,205	9,075	6700	2.37%	1.19%	1.06%
590118	STH 23	5800	2011	7000	10486	1.66%	8,111	(2,375)	10100	9043	1.95%	6,816	1.27%	6,384	7,247	8,111	5800	2.52%	1.35%	1.19%
591421	STH 23	6400	2011	8600	12910	1.67%	8,966	(3,944)	10800	12910	3.34%	8,324	0.51%	8,111	8,538	8,966	6400	6.68%	0.53%	0.50%
590195	STH 23	7100	2011	8600	11917	1.29%	9,291	(2,626)	12300	10509	1.48%	8,046	1.03%	7,631	8,461	9,291	7100	1.87%	1.09%	0.98%
590197	STH 23	9400	2011	9500	13117	1.27%	12,263	(854)	15400	11513	1.41%	10,595	1.05%	10,039	11,151	12,263	9400	1.70%	1.11%	1.00%
					Existing EST 2035	Existing	Existing			No Build EST 2020	No Build 2020			No Build 2015	2025	2035		2011-2015	2015-2025	2025-2035
200424	CTH K	4500	2003	4500	5560	0.79%	5,631	71	-	5919	2.10%	5,351	0.35%	4,563	5,444	5,631	4500	0.35%	1.93%	0.34%
201021	CTH UU	1100	2003	1100	1254	0.47%	1,264	10	-	1132	0.19%	1,119	0.86%	1,138	1,168	1,264	1100	0.86%	0.26%	0.83%
201022	CTH UU	1200	2003	1200	1431	0.64%	1,446	15	-	1236	0.20%	1,222	1.23%	1,259	1,297	1,446	1200	1.23%	0.30%	1.16%
200126	CTH W	1700	2003	1900	2278	0.66%	2,061	(217)	-	2106	0.72%	1,811	0.92%	1,763	1,894	2,061	1700	0.92%	0.75%	0.88%
200397	CTH G	990	2003	1200	1278	0.22%	1,059	(219)	-	1481	1.56%	1,129	-0.42%	974	1,106	1,059	990	-0.42%	1.36%	-0.42%
590193	CTH A	640	2008	660	1014	1.79%	949	(65)	-	816	1.58%	731	1.99%	691	803	949	640	1.99%	1.63%	1.81%
590206	CTH C	3200	2008	3200	4473	1.33%	4,346	(127)	-	3825	1.30%	3,575	1.44%	3,384	3,832	4,346	3200	1.44%	1.32%	1.34%
590682	CTH C	1800	2007	2100	2835	1.17%	2,388	(447)	-	2343	0.77%	1,925	1.60%	1,915	2,079	2,388	1800	1.60%	0.86%	1.48%
					Build EST 2035	Build	Build			Build EST 2020	Build 2020			Build 2015	2025	2035		2011-2015	2015-2025	2025-2035
200424	CTH K	4500	2003	4500	6957	1.82%	7,121	164	-	6164	2.47%	5,498	1.97%	4,958	6,039	7,121	4500	2.54%	2.18%	1.79%
201021	CTH UU	1100	2003	1100	1698	1.81%	1,738	40	-	1585	2.94%	1,391	1.66%	1,275	1,507	1,738	1100	3.99%	1.81%	1.53%
201022	CTH UU	1200	2003	1200	1569	1.03%	1,594	25	-	1350	0.83%	1,290	1.57%	1,189	1,391	1,594	1200	-0.23%	1.70%	1.45%
200126	CTH W	1700	2003	1900	2676	1.36%	2,441	(235)	-	2435	1.88%	1,987	1.52%	1,836	2,138	2,441	1700	2.00%	1.65%	1.41%
200397	CTH G	990	2003	1200	1726	1.46%	1,453	(273)	-	1551	1.95%	1,164	1.66%	1,067	1,260	1,453	990	1.95%	1.81%	1.53%
590193	CTH A	640	2008	660	980	1.62%	919	(61)	-	788	1.29%	714	1.91%	646	783	919	640	0.24%	2.11%	1.74%
590206	CTH C	3200	2008	3200	4439	1.29%	4,315	(124)	-	3784	1.22%	3,550	1.44%	3,296	3,805	4,315	3200	0.75%	1.55%	1.34%
590682	CTH C	1800	2007	2100	2735	1.01%	2,308	(427)	-	2408	0.98%	1,958	1.19%	1,842	2,075	2,308	1800	0.58%	1.27%	1.12%

Administrative Record 22477-22478-SEE Page 39-40

Location	Counts	Counts	Counts	Counts	Counts
Year	2001	2005	2008	2011	2012
201185	13600	11425	12500	11100	10848
200219	8100	8600	11700	10000	9455
206104	7800	8200	9500	7600	7452
200222	6800	8600	8800	7300	7650
200224	6800	7625	7700	6700	7084
590118	6400	9150	7000	5800	6434
590195	10000	9525	8400	7100	7439

No Build Scenario (2/1/2012)

Location	Count	Forecast	Count	Forecast	Count	Forecast
Year	2001	2030	2005	2036	2011	2035
201185	13600	21800	11425	18600	11100	16300
200219	8100	12200	8600	13025	10000	11700
206104	7800	12500	8200	12525	7600	9300
200222	6800	13000	8600	16050	7300	8500
200224	6800	10800	7625	12400	6700	7500
590118	6400	10100	9150	14900	5800	6600
590195	10000	16600	9525	17375	7100	7800

No Build Scenario (2/8/2012)

	Count	TAFIS	Count	TAFIS
Location	Year	Output	Year	Output [1]
	2005	2005	2011	"2012"
201185	11425	18200	11100	15600
200219	8600	17800	10000	12100
206104	8200	11000	7600	9500
200222	8600	12400	7300	9100
200224	7625	11300	6700	8200
590118	9150	11200	5800	7200
590195	9525	14600	7100	8600

1 Estimated Traffic Analysis Forecasting informtion System (TAFIS) based on 2011 traffic counts. 2011 *actuals* have not been entered into the official year-end counts of system data.

Location	Count	Forecast	Growth	Count	Forecast	Growth
Year	2001	2030	Rate	2005	2036	Rate
West of CTH K	13600	21800	2.1	11425	18600	2.0
West of CTH UU	8100	12200	1.7	8600	13025	1.7
East of Tower Rd	7800	12500	2.1	8200	12525	1.7
West of CTH W	6800	13000	3.1	8600	16050	2.8
West of CTH G	6800	10800	2.0	7625	12400	2.0
Sheb County Line	6400	10100	2.0	9150	14900	2.0
West of County P	10000	16600	2.3	9525	17375	2.7

Location	Count	Forecast	Growth	Count	Forecast	Growth
Year	2011	2035	Rate	2012	2035	Rate
West of CTH K	11100	16300	2.1	10484	15700	2.16
West of CTH UU	10000	11700	1.7	9455	11000	0.71
East of Tower Rd	7600	9300	2.1	7452	9100	0.96
West of CTH W	7300	8500	3.1	7650	8900	0.71
West of CTH G	6700	7500	2.0	7084	7900	0.50
Sheb County Line	5800	6600	2.0	6434	7200	0.59
West of County P	7100	7800	2.3	7439	8200	0.45

Location	Count	forecast	forecast	forecast	
Year	2012	with 2%	with 1.5%	with 1%	
West of CTH K	10484	15300	14100	12900	11700
West of CTH UU	9455	13800	12700	11600	10500
East of Tower Rd	7452	10900	10000	9200	8300
West of CTH W	7650	11200	10300	9400	8500
West of CTH G	7084	10300	9500	8700	7900
Sheb County Line	6434	9400	8700	7900	7200
West of County P	7439	10900	10000	9200	8300

Cental Office Forecasts from 2001 and 2005

1	Location	Count	Forecast	Growth	Count	Forecast	Growth
	Year	2001	2030	Rate	2005	2036	Rate
	West of CTH K	13600	21800	2.1	11425	18600	2.0
	West of CTH UU	8100	12200	1.7	8600	13025	1.7
	East of Tower Rd	7800	12500	2.1	8200	12525	1.7
	West of CTH W	6800	13000	3.1	8600	16050	2.8
	West of CTH G	6800	10800	2.0	7625	12400	2.0
	Sheb County Line	6400	10100	2.0	9150	14900	2.0
	West of County P	10000	16600	2.3	9525	17375	2.7

Cental Office Forecasts from 2011 and Feb 2012

2	Location	Count	Forecast	Growth	Count	Forecast	Growth
	Year	2011	2035	Rate	2012	2035	Rate
	West of CTH K	11100	16300	2.0	10484	15700	2.16
	West of CTH UU	10000	11700	0.71	9455	11000	0.71
	East of Tower Rd	7600	9300	0.97	7452	9100	0.96
	West of CTH W	7300	8500	0.7	7650	8900	0.71
	West of CTH G	6700	7500	0.5	7084	7900	0.50
	Sheb County Line	5800	6600	0.6	6434	7200	0.59
	West of County P	7100	7800	0.41	7439	8200	0.45

NE Region linear calculation using fixed growth rates

3	Location	Count	forecast	forecast	forecast	forecast
	Year	2012	with 2%	with 1.5%	with 1%	with 0.5%
	West of CTH K	10484	**15300**	14100	12900	11700
	West of CTH UU	9455	13800	12700	11600	10500
	East of Tower Rd	7452	10900	10000	**9200**	8300
	West of CTH W	7650	11200	10300	9400	8500
	West of CTH G	7084	10300	9500	8700	**7900**
	Sheb County Line	6434	9400	8700	7900	**7200**
	West of County P	7439	10900	10000	9200	**8300**

1 These are CO forecasts that used the Box-Cox method, and used some manual adjustments at the time.

2 These are CO forecasts that used the TAFIS method, using growth rates taken from the regional demand model.

3 These forecasts were calculated by the region, using a linear correlation of the 2012 counts, to demonstrate different growth rates. These are not approved by CO forecasting.

Bold numbers show a cross check of the linear correlation to the 2012 forecast.